

WHAT IS CLAIMED IS:

1. A semiconductor structure comprising:
  - a first semiconductor layer having a thickness of fewer than eight atomic layers of a semiconductor;
  - a first atomic layer of a non-semiconductor material on said first semiconductor layer;
  - a second semiconductor layer having a thickness of less than eight atomic layers of said semiconductor on said first atomic layer of a non-semiconductor material; and
  - a second atomic layer of said non-semiconductor material said second semiconductor layer.
2. A semiconductor structure according to claim 1 wherein said semiconductor comprises silicon.
3. A semiconductor structure according to claim 1 wherein said semiconductor material comprises one or more selected from the group of Group IV semiconductors, Group VI semiconductors, Group III-V semiconductors, and Group II-VI semiconductors.
4. A semiconductor structure according to claim 1, wherein said semiconductor material comprises one or more selected from the group of Si, Ge, SiGe, GaAs, InP, InAs, GaP, GaN, GaSb, CdS, and CdSe.
5. A semiconductor material according to claim 1 wherein said semiconductor material comprises one or more selected from the group of GaAs, InP, InAs, GaP and related ternary and quaternary alloys.

6. A semiconductor structure according to claim 1 wherein said non-semiconductor material comprises oxygen.

7. A semiconductor structure according to claim 1 wherein said non-semiconductor material comprises a compound.

8. A semiconductor structure according to claim 1 wherein said non-semiconductor material comprises one or more selected from the group of oxygen, nitrogen, fluorine, and CO.

9. A semiconductor structure according to claim 1 wherein said first semiconductor layer extends across substantially all of a wafer.

10. A semiconductor structure according to claim 1 wherein said first atomic layer of a non-semiconductor material extends across substantially all of said wafer.

11. A semiconductor structure according to claim 1, wherein said semiconductor structure has conductivity effective masses for electrons and holes that are substantially less than the corresponding values for the base semiconductor.

12. A semiconductor structure according to claim 1, wherein said semiconductor structure has conductivity effective masses for electrons and holes that are substantially different than the corresponding values for the base semiconductor.

13. A semiconductor device having a channel region comprising:  
a first semiconductor layer comprising a plurality of atomic layers of a semiconductor;

a first atomic layer of a non-semiconductor material on said first semiconductor layer;

a second semiconductor layer having a plurality of layers of said semiconductor on said first atomic layer of a non-semiconductor material; and

a second atomic layer of said non-semiconductor material on said second semiconductor layer.

14. A semiconductor structure having a low conductivity effective mass semiconductor region comprising:

a first semiconductor layer having a thickness of less than eight atomic layers of said semiconductor;

a first atomic layer of a non-semiconductor element or compound other than said semiconductor on said first semiconductor layer;

a second semiconductor layer having a thickness of less than eight atomic layers of said semiconductor on said first atomic layer of an non-semiconductor element or compound other than said semiconductor; and

a second atomic layer of said non-semiconductor element or compound other than said semiconductor on said second layer of said semiconductor.

15. A semiconductor structure according to claim 14 wherein said semiconductor comprises silicon.

16. A semiconductor structure according to claim 14 wherein said non-semiconductor element or compound other than said semiconductor comprises oxygen.

17. A semiconductor according to claim 14 wherein said non-

semiconductor element or compound other than said semiconductor comprises nitrogen.

18. A semiconductor structure according to claim 14 wherein said first semiconductor layer extends across substantially all of a wafer.

19. A semiconductor structure according to claim 14 wherein said first atomic layer of a non-semiconductor element or compound extends across substantially all of said wafer.

20. A semiconductor structure comprising:  
a first atomic layer of silicon;  
an atomic layer of oxygen on said first atomic layer of silicon; and  
a second atomic layer of silicon on said atomic layer of oxygen;  
wherein said semiconductor structure has conductivity effective masses for electrons and holes that are substantially less than the corresponding values for the base semiconductor.

21. A semiconductor structure according to claim 20 wherein said semiconductor structure comprises a channel region.

22. A semiconductor structure comprising:  
a first atomic layer of silicon;  
an atomic layer of oxygen on said first atomic layer of silicon; and  
a second atomic layer of silicon on said atomic layer of oxygen;  
wherein said semiconductor structure has conductivity effective masses for electrons and holes that are substantially less than the corresponding values for silicon.

23. A silicon semiconductor structure having have conductivity effective masses for electrons and holes that are less than half the corresponding values for silicon.

24. A semiconductor structure according to claim23, wherein said semiconductor structure comprises silicon and oxygen.

25. A semiconductor structure according to claim 23, wherein said semiconductor structure comprises silicon and one or more selected from the group of, nitrogen, fluorine, and CO.